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THE EXTRA BIT FOR MICRO USERS

Trojans, Viruses & worms

by Rod Bicknell in the USA

Most viruses in New Zealand are carried on floppy disks used to transport programs (especially games) or data between computers such as Program of the Month clubs. Unethical software publishers favour viruses as cheap copy protection. Consequently viruses are likely to accompany software piracy.

The Amiga SCA Virus

An example of this type of propagation is the Amiga SCA virus recently found in New Zealand. SCA, the Swiss Cracking Association, a group of European pirates, stole the German game Mousetrap and inserted the virus into the AmigaDOS INSTALL command and then distributed it around the world. The virus is also carried by the commercial English game Gnome Ranger.

After the SCA virus, which is easily isolated and disabled if system disks and programs have been copy protected, attacks by destroying files, writing its code to boot sectors and rebooting, it displays the message:

Something wonderful has happened
Your AMIGA is alive!!!
and, even better...
Some of your disks are infected
by a virus!!!

!!! Another masterpiece of
The Mega-Mighty SCA!!!

SCA claims the virus was intended as a bit of "harmless" diversion and not to destroy disks. To cure the SCA virus, SCA offers the SCA Virus Killer. Commodore recommends avoiding it and using its publicly distributed Vcheck1.2.

The SCA virus and some other Commodore viruses can be diagnosed by inserting the suspect Workbench disk, holding down the left mouse button and using the three-key reboot. An infection will cause the screen to flash green for a second before the computer reboots.

Safe Computing

The key to safe computing, whether on IBM, clones, Apple, Commodore, Amstrad, Atari or Amiga, is basic, if usually omitted, computer practices:

- Keep write protect labels on all Operating System and program disks – if a virus can't write to a file it can't become infected or infectious. On a hard disk lock all programs into Read Only partitions if possible. At the very least, make COMMAND.COM Read Only or the computer's equivalent; the hidden system files are already in a R/O state. (With MS-DOS use: ATTRIB +R COMMAND.COM to install and ATTRIB –R COMMAND.COM to remove.)
- Cross contamination may be reduced by backing up data files and system/program files separately: data that is backed-up prior to infection can easily be restored and the write protected programs reinstalled. Data files can be infected, but most contagious viruses use operating system and program files to replicate. Periodically back up by exporting data files into ASCII Standard Data Format, as virus code generally cannot be transferred by text.
- Keep a log and be cautious importing programs and data: avoid non-copyrighted programs; be suspicious of "bargain" or "bootleg" software; be protective in bathhouse software clubs or bulletin boards as most provide programs donated (or stolen) from unknown sources and do not have the opportunity or ability to check and cull.

Caveat Emptor

- Quarantine and test questionable programs on floppies booting from A:. Most viruses attack the default drive and root directory, and an isolated floppy drive complicates the problem of the invading virus. If you have a write protect label on the floppy, any writing to the disk (abnormal in running an executing file) will produce a Write Protect error message. Lock out the hard disk(s) as an added precaution. (With an MS-DOS system use the ASSIGN command: on a single hard-drive computer give the command ASSIGN C = A and the computer won't try to write data to the C: drive. Remember to reassign or reboot the computer before resuming normal operations.)

Protective Devices

Two public domain programs expand the write protection method (which doesn't work with all viruses) of defence. They are 1 kb patches, PROTECT.COM and DPROTECT.COM. Be cautious, as a virus named DPROTECT also circultes, but has a different size.

The most advanced MS-DOS public domain virus protection programs are Bombsquad (6144 bytes) and CHk4bomb (11 kb). The writer of these $US30 user supported programs, Andy Hopkins, 526 Walnut Lane, Swathmore, PA 19081, says that Chk4bomb is the product of a long-range attempt "to place in one program everything we possibly can that helps check a suspect file for malice aforethought."

Among the "potentially dangerous disk activities" that Chk4bomb reports on are writing to absolute sectors, formatting, calls to BIOS, and direct disk access via ROM BIOS routines. Chk4bomb is particularly effective at locating viruses and Trojans infecting game programs.

FAT tables can be backed up with with Mace's Rxbak or the public domain program Fatback.

Eric Hansen, a vice president at the only US firm to manufacture an MS-DOS and Unix virus protection program (Data Physician, $US199 from Digital Dispatch, Minneapolis 612-571-740) says that selling such products is "very risky" as it is impossible to predict the form that a virus will take. A defence against one virus may be no defence against another.

Data Physician, whose main customer is the US Army, is a group of programs that detect and remove viruses as well as guard program files. it does this by saving a cryptographic checksum of each protecte file.

This "signature" is then compared with one obtained when the file is executed, and if they differ the program informs the user that the file has been altered.

Noninfectious viruses are known as Trojan horses for a reason – a Trojan detection program called Notroj is itself a Trojan that trashes disks.

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Diskscan, a free program that PC-Magazine distributed by electronic bulletin board, READs a hard disk for bad sectors. The program was maliciously rewritten to WRITE bad sectors.

Sideways, a popular commercial print utility program, is also the name of a virus that destroys boot sectors. The Trojan Sideways is about 3kb, while the legitimate program exceeds 30kb.

Dealing with a virus

Unless a virus announces itself, diagnosis is difficult. Eric Newhouse, organiser of a clearing house of virus information and education in the US, cautions against over-reaction:

"Don't get hysterical. A virus rumour is much easier to start than to stop. If your system locks up, it isn't necessarily a virus; it just might not like co-residing with Superkey or your graphics card." All too often computer users blame viruses for other computing ills.

A check should be kept of operating system file dates and sizes. The public domain Vaccine would do this or it could be done manually.

With computers using only floppies or tapes, a virus is killed when the computer is switched off and left off for a minute; the infection from a floppy spreads only if it stays in a drive.

On an Amiga, the CLI command INSTALL may deinfect boot disks. Do not use INSTALL with copy protected disks as it will damage them. Remember to switch your Amiga off for a few minutes after disinfecting disks.

In a hard disk system, a contaminated operating system file will infect any program run on the computer. Diagnose damage before reconstruction as with any other crash.

A low-level format is the fastest and safest method of purging a system – this is no time to learn chain codes, boot sectors, FATs and TODs. Programs can be reinstalled from copy protected disks and files backed up prior to infection restored.

Although the following is in MS-DOS jargon, the process would be similar with any make of computer. Just the terminology changes.

Has the [hard] disk been low- or high-level formatted? Are the hidden system files corrupted? Have some or all files been erased? Has the boot sector been erased/formatted? Are the FAT and/or TOD tables scrambled?

If the computer has been low-level formatted, backup is the sole hope. High-level formatting can be dealt with reasonably easily with Mace + or Norton Advanced Edition, as can erased files.

The system files and boot sector may be able to be replaced with the command SYS C: from the original (copy protected) system floppy disk. This may install uninfected operating system files on the drive.

If this fails, the highly experienced can use Norton Utilities in an attempt to repair the boot sector FAT and TOD tables.

All available data should then be backed up or copied and the disk low level formatted.

The virus source should be located if possible. The more accurate a log of users, input, output, and installation has been kept, the easier this will be. Finding the source without a log may prove impossible even with a single user computer.

While viruses are usually taboo subject in the computer world, as early as 1959 Scientific American [June 1959, May, 1984, March 1985] recognised the fascination of viruses and published core war games. these games, which pitted one virus against another and were named DWARF, Animal, and Left Hand of God, drew a worldwide response, including comments from Stephen Peters of Timaru, New Zealand.

Abundant examples

"There are," says A.K. Dewdney in the Scientific American computer recreation pages, "abundant examples of worms, viruses and other software creatures living in every conceivable computing environment. Some of them are so horrifying that I hesitate to set them down at all."

An early manipulative Italian virus, says the magazine, was a device that periodically displayed the massage:

IS YOUR DISK
SLIPPING?
It's time you got
DOS DOCTOR
available on disk at a
computer store near you

as it went about its deadly tasks.

More vicious are the Softguard copyprotection viruses that some software manufacturers include with their copyrighted software. Also, beware of the utility SUG.COM that often accompanies Softguard copy protection, which is a worm that destroys disks.

Widespread virus and core wars take place between PC, clone, and Apple and other computer aficionados in California's Silicon Valley. There, in the womb of personal computer development and manufacturing, viruses combat other viruses.

Above all, warns Kenneth Weiss, technical director at Security Dynamics Technologies Inc., a computer security company in Cambridge, Mass., don't overlook the obvious:

"The larger problem is how to secure systems against people legitimately working with them."

Remember that although the most talented of hackers have always loved designing programs just to harass other users, the community has survived, strengthened and grown. ■

ollingScrollingScrollingScrollingScrollingScrolling

By Joe Colquitt

Regular readers of Bits & Bytes may have been bewildered to discover a piece of code in last months issue which failed to go anywhere.

The following article contains both the offending code structure as well as the rest of the program.

This article was written with Commodore 64 6502/6510. Other 6502 machines will run examples if corrections are made to addresses. The C64 calls ML with SYS, other BASIC may use CALL or USR etc.

The third article on scrolling deals with fine scrolling. This requires fairly precise timing, something you'll have to work into your own program plan. Unfortunately in this area of programming, the hardware imposes some restrictions for which you have to make allowances. If you take a close look, a lot of games that appear to have a large panoramic view, in fact scroll less than ⅔ of the screen. The effect comes as much from the presentation as it does from the programming. By creating tension or desperation, the scroll becomes of secondary importance to the player. Games that have a whole screen scroll tend to be fairly slow, eg Skramble, Zaxxon and Blue Max. This may be worth considering if you have problems with screen stability when scrolling. The examples are outlines, and will more than likely need minor alterations to perform at their best in your program.

The explanation here is for a right-to-left scroll. You need to use two screen, screen1 and scren2. First copy screen1, the visible screen, to scren2 (an area in RAM), with a one character offset to the left. Then put new data down the right hand side of screen2. Move the video area left one pixel at a time (by decrementing 53270). After 7 pixel shifts, bring screen2 into view, (by changing $DO18) and immediately restore the video area to its right-most position. When screen2 is brought into view, the display jumps 8 pixels left (due to the 1 character offset), but jumps 7 pixels right when $DO16 is reset.

Overall display gain is therefore 1 pixel. The copy pointers to screen1 and screen2 are reversed, and the process repeated. Two screens have to be used for a large scroll because the speed of the raster doesn't allow time for a copy on the same screen between scans. If you change LDX#$19 to LDX#$06 and have only DEC$F9 DEC$FB, the top half of the display runs normally, but the bottom half is not being continuously copied from one screen to the other. Changing $DO18 thus displays the same data scrolling across the top, but two different sets of data at the bottom. As usual, the smaller the portion of screen scrolled, the faster it can go. The slowest part of the routine is the copying of data from screen1 to screen2, so if any speed improvements are to be made, it will probably be in this area. As is, though, the code will cope quite well with a full 25 line scroll. In the example, there are 7 preset delays, and one caused by scroll flow halting to copy screen1.

Ideally, this delay should be the same as the presets, so that an equal time elapses between pixel shifts. To get it exactly right, op-code execution times are documented in several common books. To illustrate, a zero-page, Y index instruction takes 5 or 6 cycles, whereas an absolute,Y takes 4 or 5. When performing many loop instructions, a difference of 1 cycle can be important. Our routine uses two zero-page instructions 1000 times, taking 1/500th sec. which is significant compared to the speed of the raster scan. Purely for the sake of readability and to demonstrate the principle, I've only used zero-page,Y.

One relief in all this is that sprites don't move relative to the border when $DO16 is changed. The code below can be re-written slightly so that it flows more elegantly. I originally had it that way, but this format is more readable. Remember the computer doesn't have to understand what it's told to do, only do it. If you've a program which uses the space $3000-$3FE7, the area for screen2, you'll have to make screen2 in another bank.

The down-scroll shows screen switching is not necessary for part-screen moving. The sprites are used to make a false border. I've left a gap on the right to show the disappearing display. The in-line coarse copy is significantly faster than indexing, and I'd use it more in the column if it didn't take so much room. The lower part of the screen is useful only for sprites, as it doesn't scroll, but just jumps up and down. Split-screen (interrupt) scrolling is next month's topic.

Whole screen pixel scroll

```
C000 LDA#$3C    ;set screen1 as 3C00
C002 STA$F9     ;
C004 LDA#$04    ;set screen2 as 0400
C006 STA$FB     ;
C008 NOP        ;oops
C009 NOP        ;
C00A LDY$F9     ;SWAP
C00C LDX$FB     ;now screen1=0400
C00E STY$FB     ;and screen2=3C00
C010 STX$F9     ;
C012 LDA#$00    ;set low bytes
C014 STA$F8     ;
C016 STA$FA     ;
C018 LDX#$19    ;number of screen lines
C01A LDA$D011   ;wait for raster
C01D BMI$C01A   ;
C01F LDY#$27    ;number of columns
C021 LDA($F8),Y;get screen1 data
C023 DEY        ;1 char offset
C024 STA($FA),Y;put in screen2
C026 CPY#$00    ;check lower col limit
C028 BPL$C021   ;if >0 loop
C02A LDY#$27    ;else new data
C02C LDA$DC12   ;
C02F STA($FA),Y;into right-hand column
C031 DEX        ;
C032 BEQ$C050   ;check line limit
C034 CLC        ;add 40dec to source
C035 LDA$F8     ;and destination
C037 ADC#$28    ;addresses
C039 STA$F8     ;
C03B LDA$F9     ;
C03D ADC#$00    ;
C03F STA$F9     ;
C041 CLC        ;
C042 LDA$FA     ;
C044 ADC#$28    ;
C046 STA$FA     ;
C048 LDA$FB     ;
C04A ADC#$00    ;
C04C STA$FB     ;
C04E BNE$C021   ;of course <>0 so loop
C050 JSR$C0A0   ;pixel moves left
C053 LDA$D018   ;change screen on view
C056 CMP#$15    ;
C058 BEQ$C061   ;
C05A LDA#$15    ;
C05C STA$D018   ;
C05F BNE$C066   ;
C061 LDA#$F5    ;
C063 STA$D018   ;
C066 DEC$F9     ;return F9/FB to initial
C068 DEC$FB     ;values to compensate for
C06A DEC$F9     ;addns at C034
C06C DEC$FB     ;
C06E DEC$F9     ;
C070 DEC$FB     ;
C072 JMP$C00A   ;re-enter at SWAP
C075 LDX#$00    ;entry for routine
C077 LDA$D012   ;fill screen with random
C07A STA$0400,X;chars
C07D STA$0500,X
C080 STA$0600,X
C083 STA$0700,X
C086 LDA#$03
C088 STA$D800,X
C08B STA$D900,X
C08E STA$DA00,X
C091 STA$DB00,X
C094 INX
C095 BNE$C077
C097 LDA#$C7    ;initialise scroll reg
C099 STA$D016   ;
C09C JMP$C000   ;begin scroll
C09F
C0A0 LDA$D016   ;start pixel position
C0A3 ORA#$07    ;at 7
C0A5 STA$D016   ;
C0A8 LDY#$70    ;delay
C0AA LDX#$21    ;
C0AC DEX        ;
C0AD BNE$C0AC   ;
C0AF DEY        ;
C0B0 BNE$C0AA   ;
C0B2 LDY#$FA    ;wait for raster
C0B4 CPY$D012   ;
C0B7 BNE$C0B4   ;
C0B9 DEC$D016   ;1 pixel to left
C0BC LDA$D016   ;
C0BF AND#$07    ;
C0C1 BNE$C0A8   ;if < 7 pixel shift
C0C3 LDY#$70    ;delay
C0C5 LDX#$21    ;
C0C7 DEX        ;
C0C8 BNE$C0C7   ;
C0CA DEY        ;
C0CB BNE$C0C5   ;
C0CD LDY#$FA    ;
C0CF CPY$D012   ;
C0D2 BNE$C0CF   ;
C0D4 LDA$D016   ;last shift
C0D7 ORA#$07    ;
C0D9 STA$D016   ;
C0DC RTS        ;
```

Scroll down

```
10 GOSUB50
20 PRINT"[clr]":POKE53280,11:POKE53281,.
30 SYS49256
40 SYS49217
50 V=53248:POKEV+21,255:POKEV+29,255
60 FORI=0TO4:POKEV+1+I*2,110:POKEV+I*2,
   24+I*48
70 POKE2040+I,192:POKEV+39+I,I+1:NEXT
80 FORI=0TO63:POKE12288+I,255:NEXT
90 RETURN

C000 LDA$D011   ;may or may not be
C003 AND#$F7    ;needed
C005 STA$D011   ;
C008 LDX#$27    ;number of columns
C00A LDA$04F0,X;in-line code to coarse
C00D STA$0518,X;scroll lines, starting
C010 LDA$04C8,X;at line 6 and working
C013 STA$04F0,X;up screen to line 0
C016 LDA$04A0,X
C019 STA$04C8,X
C01C LDA$0478,X
C01F STA$04A0,X
C022 LDA$0450,X
C025 STA$0478,X
C028 LDA$0428,X
C02B STA$0450,X
C02E LDA$0400,X
C031 STA$0428,X
C034 LDA$A000,X;put new data on line 0
C037 STA$0400,X;(your routine goes here)
C03A DEX
C03B BPL$C00A
C03D INC$C035   ;inc pointer to new data
C040
C041 LDA#$18    ;set 'dummy' scroll reg
C043 STA$FF     ;to minimum
C045 LDA$D012   ;wait for raster
C048 BNE$C045   ;
C04A LDA$FF     ;move dummy to real reg
C04C AND#$F7    ;ie move display 1 pixel
C04E STA$D011   ;
C051 LDY#$0B    ;11ms delay between shifts
C053 JSR$EEB3   ;(NB destroys X)
C056 DEY        ;
C057 BNE$C053   ;
C059 INC$FF     ;test dummy for limit
C05B LDA$FF     ;
C05D CMP#$20    ;
C05F BNE$C045   ;
C061 JMP$C008   ;if yes, coarse scroll
C064 LDX#$00    ;colour screen
C066 LDA#$03
C068 STA$D800,X
C06B STA$D900,X
C06E INX
C06F BNE$C068
C071 LDA$D011   ;shrink border
C074 AND#$F7
C076 STA$D011
C079 RTS
```

When Intel invented the microprocessor in 1971 they created an technology which is as far reaching as any other known to man.

Representation of Intel in New Zealand has recently been taken over by Switch Enterprises, a division of Email Industries (New Zealand) Ltd., a company specialising in electrical equipment.

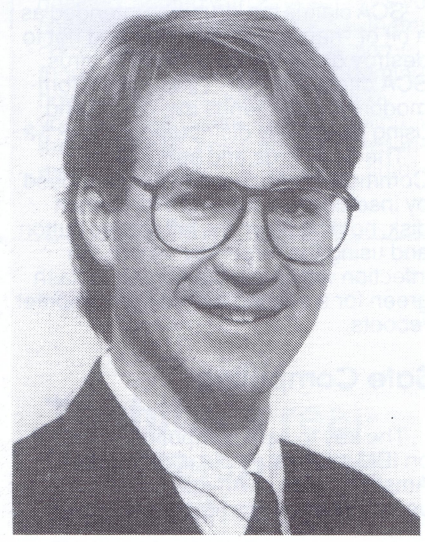
Switch Enterprises has appointed Mr Steven Van Veen Sales engineer for the Intel range of product.

Switch Enterprises will distribute Intel's range of microchips while North Shore based Tech Pacific will continue to supply Intel devices for the PC market.

Mr Van Veen has most recently been a field systems engineer and communications co-ordinator with Telecom.

Steven Van Veen (left), Switch Enterprises manager Dean Danford and Intel's Australian Manager, Bruce Patterson (right).

Appointments



John Barlow, formerly head of permanent placement of DP personnel for a Wellington recruitment company, has joned ComputerPeople's Wellington office as Senior Permanent Consultant.

Mr Barlow has three year's recruitment experience in the computer industry and previously held positions with IBM New Zealand and AWA New Zealand.

ComputerPeople New Zealand manager Peter Dickinson said Mr Barlow's experience in permanent placement would strengthen the development of ComputerPeople's new permanent placement division in Wellington.

ComputerPeople specialises in personnel recruitment in the data processing industry and is a division of Morgan & Banks, Australasia's fastest growing management consultancy. The firm's Wellington office services the Wellington region and the South Island.

Mr Dickinson said ComputerPeople may ultimately use Mr Barlow's extensive experience to assist with the development of computer recruitment operations internationally.

Divining the true worth of Randomness

by Tim Hartnell

Random numbers were invented by the Chinese sage Li Ran Dum, in 1347, and his heirs still receive a royalty for every random number generated in the world.

Your computer probably comes with an inbuilt function to generate random numbers. Actually, the numbers are not really random, as they are the result of a decision – or decisions – made by the computer, in line with an inbuilt program. This program dictates specific actions in response to specific situations. Therefore, if you knew the computer's inner program, and what it was responding to, you'd be able to predict exactly which 'random' number it would select next.

Fortunately, although the computer choses each number from a list, and then repeats the list when it gets to the end, the list is so long you'd have a pretty difficult time trying to work out where the list began again. The BBC Micro, for example, when you wind it up fully, can produce a random number every 1.5 milliseconds.If you let it go on generating these numbers (and paying the royalties to Li Ran Dum's family), it would take 150 days before the sequence began to repeat itself.

How does your computer create its random numbers?

There are many 'random-number' algorithms in existence. An early one was developed by one of the grandfathers of computers (and I don't mean Les Bell, even earlier than that). John von Neumann worked out a method of generating random numbers based on taking a four-figure number (such as 8931), then squaring it (to produce, in this case, 79762761), and from that selecting the middle four digits (7627). These were used as the first random number, then they were squared (58171129) to create the next number in the sequence (1711) and so on.

Here's a program to create von Neumann numbers on your computer.

When it starts, enter any four-digit number. It will run for a while, then stop, expecting a new input. You can stop the program at any time by entering a number which is less than 1000. If you have a Sinclair computer (ZX81, SXpectrum of QL), substitute the material given after the REM in line 80 for line 70. Non-Sinclair owners should simply ignore line 80:

```
 10 REM Von Neumann Numbers
 20 REM Enter number below 1000
    to end
 30 CLS
 40 PRINT:INPUT "Enter number ";A
 50 IF A<999 THEN END
 60 B$=STR$(A*A)
 70 A=VAL(MID$(B$,4,4))
 80 REM Sinclair computers:
    LET A=VAL(B$(3 TO 6))
 90 PRINT A;
100 IF A>999 THEN 60
110 GOTO 40
```

As you'll soon discover, this does not produce the world's most satisfactory random numbers. In many cases, the numbers start to repeat fairly quickly.

Now most random number generators inside microcomputers use a formula along the lines of SEED=(ANUMBER *SEED+ANOTHERNUMBER) MOD YETANOTHERNUMBER. SEED is then fed back into the formula for the next run through. As you probably know, modular division returns the remainder of a division (so 10 MOD 3 is 1) and not all computers include MOD in their vocabulary. However, it is pretty simple to simulate it. Here's a simple program to generate random numbers using an approach similar to the one which probably occurs deep in your computer's electronic gizzards:

```
 10 REM Modular Seeds
 20 CLS
 30 INPUT "First big number ";A
 40 INPUT "Second big one ";B
 50 INPUT "Now a little number ";C
 60 INPUT "And now the seed ";SEED
 70 SEED=((A*SEED+B)/C)-INT
    ((A*SEED+B)/C)
 80 PRINT SEED
 90 GOTO 70
```

The first two numbers (A and B) should be pretty big, and the next two (C and SEED) should be relatively small. for a run which continues for a long, long time without repeating, try 1478392 for A, 5228791 for B, 778 for C and 459 for SEED.

How random are the numbers produced by your computer's generator?

It is pretty easy to find out how random the numbers are, by writing a program which not only generates the numbers, but also works out their distribution. You'll notice in the next program, which does this, that line 30 is RANDOMIZE. This works differently on different computers, but is designed to ensure the random number generator starts its inner sequence of numbers at an unpredictable point. You may be asked to enter a 'seed' when you use RANDOMIZE. If you are, just glance at your watch, and enter the number of seconds past the minute currently showing.

```
 10 REM Distribution of Numbers
 20 CLS
 30 RANDOMIZE
 40 DIM A(10)
 50 FOR J=1 to 1000
 60 B=INT(RND(1)*10+1)
 70 A)B)=A(B)+1
 80 NEXT J
 90 FOR J=1 TO 10
100 LPRINT J;" > ")A(J)10;"%"
110 NEXT J
```

As you can see, this program stores the frequency with which the numbers are generated in an array, then with the line 90 through to 110, prints the frequency out as a percentage of the whole run. (My version uses LPRINT in line 100 to print out the results to the printer. By all means change this to PRINT if you only want the output on the screen.)

I ran the program twenty times, and took an average of the results. If the random number in my IBM PC was perfect, and I ran the program for an infinite time, each number from one to ten in my sample would occur exactly 10% of the time. As you can see, even with the relatively small sample, the output is pretty close to this ideal distribution:

```
 1 > 10.08 %
 2 > 10.035 %
 3 > 10.245 %
 4 > 10.12 %
 5 > 9.845 %
 6 > 9.805 %
 7 > 9.97 %
 8 > 9.859999 %
 9 > 9.984999 %
10 > 10.055 %
```

Try it on your computer, and see how the results compare with mine.

Now there may be times, say when creating computer simulations, when you want skewed random numbers; numbers which are biased in some way, rather than being evenly distributed across the range. This is fairly easy to do. If you want, for example, the lower numbers to appear more often than the higher ones, all you have to do is change line 60 of the above program to:

60 B=INT(RND(1)*RND(1)*10+)

I did this, and ran the program five times, and again averaged the results. This is what I got:

```
 1 > 33.1 %
 2 > 18.68 %
 3 > 14.68 %
 4 > 10.06 %
 5 > 7.26 %
 6 > 6.04 %
 7 > 4.7 %
 8 > 3.1 %
 9 > 1.6 %
10 > .78 %
```

How does this work? Simply by the fact that RND(1) produces a number between zero and one, and multiplying any such number with another similar one produces numbers which tend to be lower (i.e. towards zero) than higher.

I couldn't think of a method which was elegant for biasing them upwards (and I'd love to hear from you if you have any such method; just write to me care of Your Computer). I finally settled on:

```
55 D=RND(1)+RND(1):IF D>1 THEN
    55
60 B=INT(D*10+1)
```

I ran five trials of this (with again 1000 numbers being generated each trial) with the following results:

```
 1 > 1.08 %
 2 > 3.22 %
 3 > 4.88 %
 4 > 6.96 %
 5 > 8.58 %
 6 > 10.52 %
 7 > 12.56 %
 8 > 15 %
 9 > 18.14 %
10 > 19.06 %
```

This certainly seems to have skewed them the right way, although I think my way of doing it is a little brutal, and definitely disturbs the sequence of numbers produced by the random number generator, rejecting one of the numbers from time to time.

There are a few other interesting random number routines I'd like to share with you this month. If you need a set of random numbers, in which the same number does not recur, you can use a routine like this one, which produces the numbers one to ten, in a random order, with none of the numbers repeated:

```
10 REM Non-Repating
20 RANDOMIZE
30 CLS
40 DIM A(10)
50 FOR C=1 TO 10
60 B=INT(RND(1)*10+1)
70 IF A(B)<>0 THEN 60
80 A(B)=B:PRINT C;">";B
90 NEXT C
```

John von Neumann, who invented the 'pick a four-figure number, then square it' method of generating random numbers, also developed a rather neat way of working out areas enclosed by an irregular border, based on random numbers. His method is called the Monte Carlo Method. It works on the basis that, if you had a map of an area containing a single continent, and you dropped darts on the map randomly, and then counted how many darts fell within the continent on the map, and how many fell outside it, the area of the continent would be proportional to the number of darts which fell within it, compared to those which fell outside it. By knowing the area covered by the whole map, it would be simple to work out an approximation to the area of the continent.

We can use such a method to work out an approximation to PI. Imagine a square, with a circle drawn in the square which just touches the sides. Now, mentally divide the square, and the circle, into four. Throw away three-quarters of the square, and keep the remaining quarter, which contains a quarter circle.

Now, imagine that you were dropping darts on the square in such a way that they had an equal chance of falling anywhere within it. Some would land within the quarter circle, and some would land outside it. If the darts were dropped in a perfectly random manner, the ratio between those which fell within the quarter circle, to those which fell outside it, would be PI divided by four. This program 'drops the darts' for you:

```
 10 REM Monte Carlo PI
 20 CLS
 30 RANDOMIZE
 40 A=0: B=0
 50 GOSUB 120
 60 B=B+D
 70 A=A+1
 80 P=4*B/A
 90 PRINT A;ABS(3.141593-P);TAB
    (23);P
100 IF 500*(INT(A/500)=A THEN
    LPRINT A; ABS(3.141593-P);TAB
    (23;P
110 GOTO 50
120 D=0
130 M=RND(1)
140 Z=RND(1)
150 IF M*M+Z*Z<1 THEN D=1
160 RETURN
```

You can see, in line 90, that I've used 3.141593 as an approximation of PI, to check the accuracy of the value of PI produced by the program. If your computer has a PI value wired in, substitute this for my 3.141593. The program prints out, in line 90, the number of darts you've dropped (A), the difference between 3.141593 and the number you're calculating as an approximation to PI (3.141593-P) and, finally, 'your' version of PI (P).

After 'dropping' 500 darts, the first time I ran the program, I got a value of 3.088 for PI, an error of around .0536. This is not too bad. However, I didn't think it was good enough, so ran the program until it had dropped 26000 darts (patience required here), with this output from line 100 towards the end of that run:

```
22000   6.320238E-03   3.135273
22500   4.526377E-03   3.137067
23000   5.940914E-03   3.135652
23500   7.124901E-03   3.134468
24000   4.259587E-03   3.137334
24500   8.368492E-03   3.133225
25000   8.152962E-03   3.13344
25500   6.847859E-03   3.134745
26000   6.977558E-03   3.134616
```

It is very interesting to watch as the program 'homes in' on the value of PI.

I modified line 100 so that it would only print out after each 5000 darts, and left the computer to get on with the job. Five and a half hours (and one hot PC later), I'd dropped half a million darts, to get a value of 3.143612 for PI: ■

BOOK REVIEWERS

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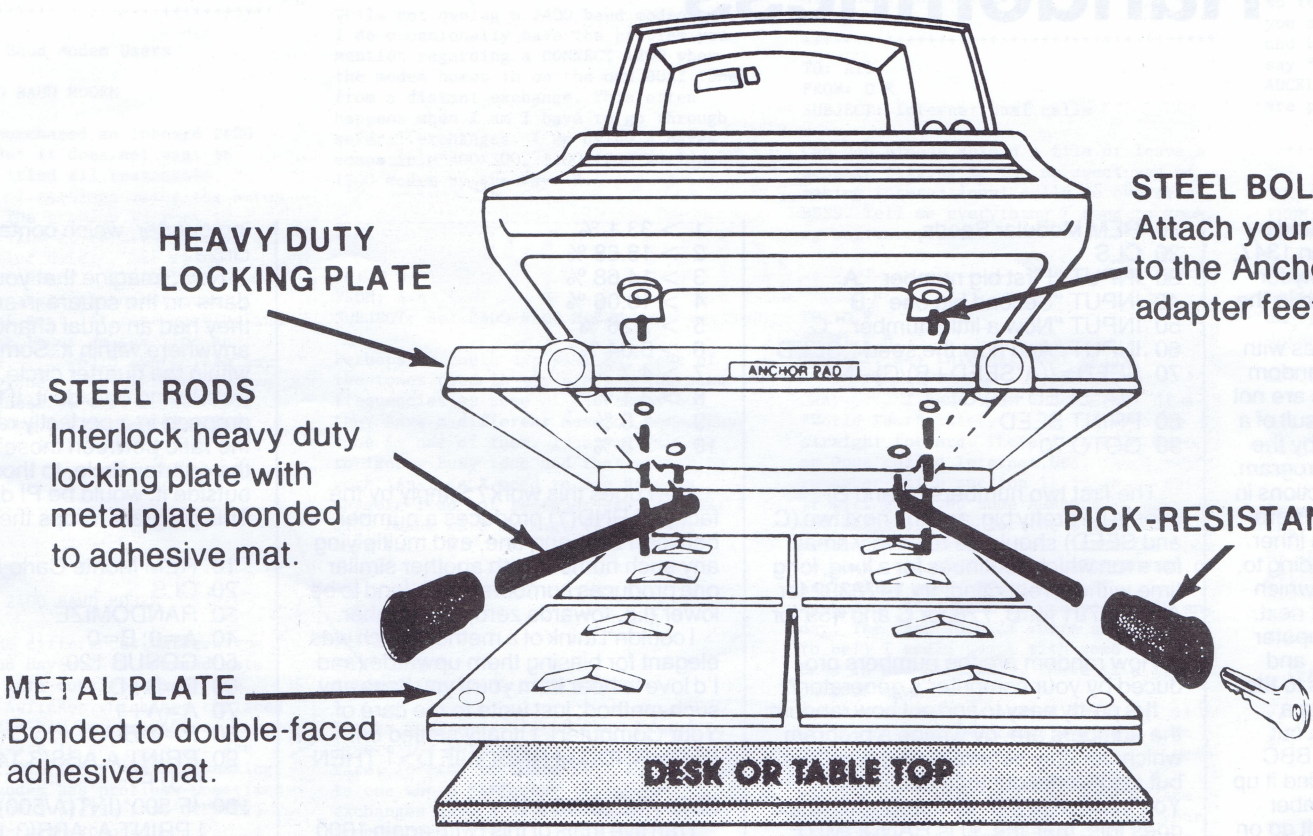
Stop Thief



Across the Tasman it is estimated computer hardware worth more than $20 million was stolen in 1987, an increase of 100 percent on the previous year. In the US office burglaries significantly outnumber home break-ins. In addition, studies claim up to one third of the workforce steals regularly from employers.

As well as the loss of hardware, the damage caused by the loss of software can do irrepairable harm to a company's operations.

In recognition of the growing chances of losing valuable equipment, Wellington's Professional Computer Supplies is marketing a range of "Anchor Pad" components manufactured in the US.

The locking pads can be quickly and securely fastened to a desk-top, without damanging the surface and are designed to hold monitors, computers, printers, facsimile machines and other office equipment hard and fast.

They feature a double sided mat which locks a steel mounting plate to the desk or workstation with a force of 2500 kg. The mat may be removed using a special heat process. A high-impact aluminium platform, with an optional 360 degree swivel is attached to the base of the machine and the whole lot is joined together using a special 'pick-proof' locking device.

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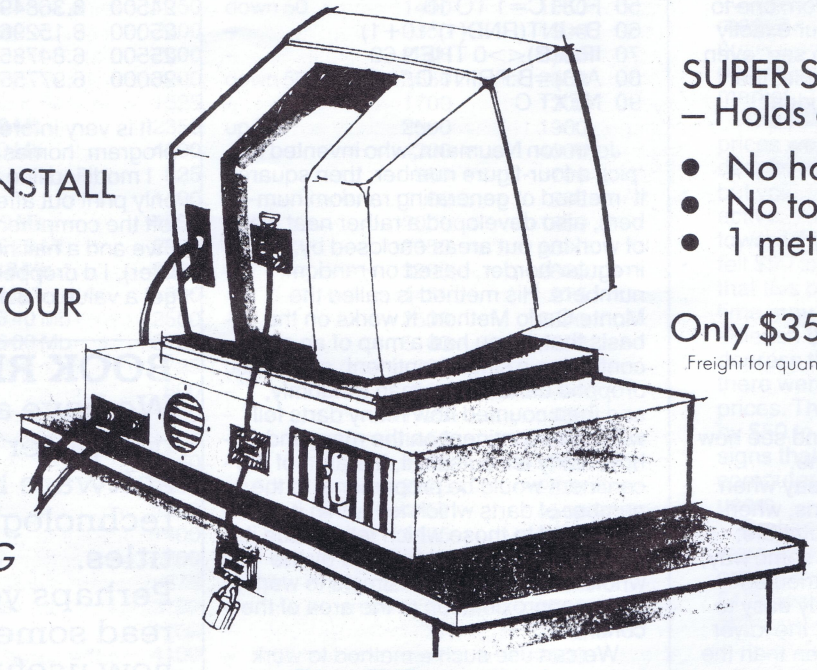

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Less eye strain with clean screen

To avoid eye strain and increase efficiency, your VDU/CRT screen, should always be clean.

Now, at last, there's a effective cleaning kit that comes in a clever little package to keep at your fingertips. Called Cleanbox, and available for normal or coated screens, it comes in a handy carton containing CleanWet/CleanDry double pads with an extra general purpose cleaning cloth. Safe and easy to use, CleanBox is also ideal for cleaning keyboards, telephones, photo-copier glass and other surfaces. CleanBox is in blue and white packs at computer stores.

Games are to be played

by Timothy Howell

We've all heard the promises before: arcade action, arcade quality graphics etc. But how well does the old Commodore 64 cope with these demands, and are these claims justified? Fortunately the '64 can cope surprisingly well when rendering authentic arcade games and in this respect the claims are justified on the whole, despite the poor conversions that are available. And the games themselves take up far less space in your room!

This month I am going to have a look at some of the more recent 'licensed' arcade games that have been converted for the '64.

Many of Britain and America's top companies battle in the race to buy the rights to officially convert many of the world's arcade games to the small screen. Thousands of pounds (or dollars as the case may be) are spent on acquiring these rights but the results, for the software companies anyway, are usually most favourable. Unfortunately it seems that many games are sold on the basis of their names; the quality of the games themselves are often disregarded. More recently however it seems that the quality of the games has improved, which is good because it benefits all involved: the games will probably sell more, and a better game will be produced.

Companies such as Elite, Ocean / Imagine and US Gold are the most prominent producing arcade conversions and it is from these that some of the best and worst games have emerged.

Ocean and Imagine (which are more or less the same company) have produced a great range of games, particularly conversions from the Japanese arcade manufacturer Konami. Of these there have been a varied mix of good and bad ones.

'Hypersports' was the first conversion done by Imagine and is another one of those sports games where you compete against the computer in various sports such as swimming, vault, weightlifting and skeet shooting. Another relatively early Imagine game was 'Yie Ar Kung Fu'. This is a martial arts game where you compete against different enemies who all wield dangerous weapons. Although this game was quite hard, it was not really a good conversion, but rather an interesting game in its own right. The imaginatively titled 'Yie Ar Kung Fu II' was a sequel to the aforementioned game and was really completely different, because instead of having the action on one screen, now the fights were over three screens, which 'flicked' when you got to the edge of one.

'Green Beret' was an excellent, but very difficult, combat game in which you had to reach the end of four right-scrolling sections while dodging bullets and other soldiers. On later screens helicopters dropped bombs and there were extra obstacles at the end of each level.

Moving to more recent times, Imagine has released several conversions. 'Rastan' is yet another 'warrior' type game spread over several scrolling levels. Extra weapons have to be picked up so you can successfully progress. This game, while initially quite absorbing, soon becomes repetitive and overall it really is quite average.

'Combat School', on the other hand, has been very adeptly produced. Although it is another 'events' style game, the events are different. You have to train through several events os as to be able to fight your instructor in the final battle. These events include an obstacle course and several rifle ranges. Despite this variety the events are extremely difficult and trying to qualify can be very stressful on both yourself and your joystick.

'Renegade' is another combat game set in more urban scenery. You have to fight street gangs. Although it has nice sound and graphics, I don't like the way you have to use the joystick for movement and the keyboard for your actions.

'Target Renegade', the sequel, has recently been released and in spite of the improved graphics the gameplay is generally the same.

Elite Systems have been around the conversion scene for a long time and accordingly snapped up the rights for several of the big games.

'Commando' was one of their first conversions and this involves you as a soldier trying to shoot other soldiers on a upwardly scrolling screen. Various vehicles and trenches also act as obstacles. While the game itself was great fun, it was badly bugged – sometimes your sprite completely disappears – and this spoils an otherwise enjoyable game.

However Elite made up for this deficiency with the brilliant, and much copied, 'Ghosts 'n' Goblins'. In this game you are a knight who has to fight his way through a variety of ghosts and goblins (hence the title) to save the princess at the end. The game, given the limits of the '64, is virtually identical.

US Gold's classic 'Gauntlet', a two player maze-type exploration game must feature in many a game player's collection. Recently 'Gauntlet II' was released and it is basically more of the same. While a couple of features have been added, I found the scrolling to be more sluggish than before and this detracts from what enjoyment the game might have held. It's not recommended, even if you are a Gauntlet fanatic.

One US Gold game that cannot be forgotten, if not at least for the hype that it generated, is 'Out Run'. Actually the game itself is not bad. While the graphics are a bit chunky, the sound is quite good. The problem is that it isn't fair to call it the same name as its arcade counterpart which has better graphics, sound and in particular a hydraulic system which adds most of the fun. Also, some game features have been left out – like extra routes.

Although US Gold buy an enormous number of licences, many of the games, even in the arcades, leave a lot to be desired. Of the many games available, games such as 'Rygar', 'Indianna Jones', 'Metrocross' and 'Karate Champ', while perhaps being accurate conversions of the original (and sometimes not even that) are not worth getting.

One recent release, again by Elite, is 'Ikari Warriors'. This is a one or two player Commando-style game. It is really quite difficult but the number of sprites and the varied, yet slightly blocky graphics, make it a challenging and enjoyable game.

Activision is yet another large well known international software company which also produces some of the worst games available. One particularly disappointing example is 'Enduro Racer' which is a conversion from an excellent motorcycle racing simulation. Everything is unfortunately bad in this game and it is really an immensely disappointing release, especially so because the game was well suited to the features of the '64.

Sometimes the original game leaves a lot to be desired and software companies cannot be at fault for producing an uninspiring product although they can be blamed for buying the licence in the first place.

In more recent months I am pleased to say that there have been some excellent conversions released – and also some bad ones. But overall it seems the software companies are beginning to see that producing poor unoriginal games does not promote confidence in the industry. Firebird's 'Bubble Bobble' is an excellent example of a game that has not only been programmed exactly like the arcade game, but is also enjoyable to play. One or two players can play at the same time in this cute platform game. By shooting at the other creatures on screen you turn them into bubbles which then have to be popped by colliding with them. There are exactly one hundred screens of this sort of action and other features such as bonuses and lightning bolts become available.

Quicksilva has made a welcome return to the software scene after a load of bad releases. In their licence the infamous Pacman makes a return in 'Pac-Land' which is not another maze game but rather a sideways scrolling platform game. Although I haven't seen this one, it seems it is well looking out for.

As far as the future of the relationship between the software industry and the arcade manufacturers is concerned things are not going to cool down. US Gold have signed an agreement with arcade manufacturers Capcom (of Commando and Ghosts 'n' Goblins fame) to virtually convert everything that they produce. I only hope the original games are of as high quality. From past experience US Gold is excellent at promoting games but not too good at programming them. Imagine should produce a similar number of games in the future and one of their main conversions should be Konami's 'Salamander' which is another multiple weapon, vertically and horizontally scrolling, shoot-em-up. It is also the sequal to their 'Nemesis', a good horizontally scrolling shoot-em-up.

As far as individual games go, a good one about to come out is GO!'s 'Bionic Commandos' which is a multi-directional scrolling shoot-em-up. It is different in that by extending your bionic arm you can swing from place to place – it seems interesting to say the least!

There have been an extraordinary number of arcade games released over the last couple of years – too many to really cover here. As usual there are the good and the bad but as a warning I feel that I must add that: don't judge a game on it's packaging or on what the game is like in the arcades. True, you will have an indication of what the game involves but it must not be forgotten that when a conversion does come out, although it may have the same name as the game you like, they may vary considerably both visually, aurally and in playability. This is judging by past experience. Although it seems that the situation may be changing. Only time will tell... ■

OPIX OPIX OPIX OPIX OPIX OPIX OPIX OPIX OPIX OPIX OPIX OPIX

OPIX (OPus Information eXchange) is a sample of the interactive Technical Forum now running on the Auckland based NZ MICRO OPUS Bulletin Board System. OPUS now has now has a permanent number, (09) 460-917 answering at 300 1200 & 2400bps, running 24 hours.

++

TO: All 2400 Baud Modem Users
FROM: R G
SUBJECT: 2400 BAUD MODEM

I have just purchased an inboard 2400 baud modem. But it does not want to work. I have tried all reasonable combinations of settings using the hayes command set. The problem is that it says CONNECT 1200 (I am still trying at 1200) on carrier detect, but it does not actually connect - I receive the occassional grabage character, what I type in is not sent, or sent garbled and I can hear the tones on the line on another phone. . I would appreciate any ideas from anyone. . By the way, I have a 1200 baud inboard, that I have been using for months and the same procomm settings do not work for the 2400 baud version.

TO: R G
FROM: B S
SUBJECT: Re: 2400 BAUD MODEM

There are some differences between the Hayes 1200 and Hayes 2400 command sets mainly to do with configuration. The 1200 has DIP switches which are replaced by non-volitile RAM in the 2400 so you must use software to set them up. Are your DTR/DSR, RTS/CTS lines handshaking OK? My 2400 modem has problems sometimes logging into OPUS (refuses to CONNECT) but works fine with RUBoard and PacCom. Does the RD light on your modem flicker (do you have an RD light on an internal modem? Oh well ... good luck .... I've got a Super5 2400 here if you want a "real" modem. .

TO: R G
FROM: C M
SUBJECT: Re: 2400 BAUD MODEM

As B said the command set is different. I found with my 2400 that it did not use s11 register which caused all sorts of problems. Try (AT&C1) and (&D2). The &C1 being the carrier detect and the &D2 toggling DTR. It works well in the init string for procomm. Good luck C.

TO: R G
FROM: R M
SUBJECT: Re: 2400 BAUD MODEM

While not owning a 2400 baud moden yet, I do occasionally have the problem you mention regarding a CONNECT 1200 when the modem homes in on the odd BUSY tone from a distant exchange. This often happens when I am I have to go through several exchanges. I am using a Hayes compatible 300/300, 1200/1200 Worldport 1200 modem by the way. R.

TO: R M
FROM: S A
SUBJECT: Re: 2400 BAUD MODEM

Perhaps we could explain that some of the tones used in the USA use the same frequencies as some of our tones but they have a different meaning here. Busy tone is one of them. I set my Procomm to ignore Busy tone and that seemed to work. As I dont need to use Procomm anymore I do not remember exactly what I did. Leave me a message if you want more info. S.

TO: S A
FROM: R M
SUBJECT: Re: 2400 BAUD MODEM

Thanks S, I am aware of the command to ignore the BUSY tone, but as it is so rare, Iprefer to leave it . The problem is one where different telephone exchanges have a variety of busy-tone frequencies. R.

TO: S A
FROM: B S
SUBJECT: Re: 2400 BAUD MODEM

Aha... now you can all see the advantages of purchasing a modem that has been specially modified for NZ conditions (ie: Super5). Many of these Cheap modems coming into the country now have problems getting confused over our various exchange tones (ringing, engaged, etc).

The Super5 modems are modified specifically for NZ conditions (even to the extent of doing correct pulse dialing, ie: you don't have to subtract the digits from 10) and this is why they are not quite as cheap as the bargain basement direct import varieties.

TO: C M
FROM: R G
SUBJECT: Re: 2400 BAUD MODEM

Thanks, I shall check those out. BTW, even though the doc on my modem suggested that s11 was fixed. When I initialised it with different values, it did the right things.

++

TO: All
FROM: D K
SUBJECT: International calls

Can you please upload a file or leave a message telling me the no sweat way of making international calls to overseas BBSS. Tell me everything I need to know, eg software,costs.

TO: D K
FROM: P M
SUBJECT: Re: International calls

Okay..... I have been doing a bit of a "World Tour" lately... it is all very straight forward. There is a file here on Opus called Internat.BBS, tho I can't remember which section it is in... but it will give you some numbers. I have got heaps of them for the states, but your modem must have bell tones for them to work... I ALSO HAVE A LARGE NUMBER OF Australian ones. (Damn this ST keyboard! I'll take my Commodore 128 any day! The caps lock is where shift ought to be!) I would start with some other ones in New Zealand... There is a list on OPUS area 5.
The costs? Well, standard tolls, it is at the cheapest 47 cents a minute from Wellington southwards... ringing between midnight and 6am. You are charged a minimum of 3 minutes... so even if the sysop answers, you may as well use your time! Over seas I would heavily advise the use of Pacnet... it costs about $3.50 a minute to France for example!

TO: P M
FROM: D K
SUBJECT: International Calls

Thanks for the information but it sounds a bit too expensive for my meager resources. What is available on these overseas boards that would justify my spending a small fortune in toll calls? But thanks anyway.

TO: D K
FROM: P M
SUBJECT: Re: International Calls

There is not a hang of a lot of difference... although it is a reminder that most of Auckland's BBSs are all styled upon each other... they are quite alike, and some foreign ones are VERY different. There are MANY MANY more users in some places.. NEVER get into reading a user list unless you are 100% sure there is a quick way out. # There are no RCPMs in NZ at the moment, (a situation that I wish to some day rectify!) but there are overseas, and so the only way to use one is tolls! If you are into downloads, there is that, and best of all, there is the ability to say "Oi you lot! I'm calling from AUCKLAND NEW ZEALAND!!" Best fun if you are planning on calling back!

++

TO: All Procomm Users
FROM: R V
SUBJECT: The Break key

I have this problem that when i hit the break key, Stack Overflow comes up and i am forced to turn the machine off. Does anyone know a fix? or why this happens??

TO: R V
FROM: R M
SUBJECT: Re: The Break key

Mmmmm, never had that problem EXCEPT that earlier on in the piece I increased my internal stack size to prevent me getting the dreaded "Fatal Error.....Internal Stack Failure". Is this your problem? If so, put the following into your CONFIG.SYS file:

```
STACKS = 64.128
```

It seems to work for me on both the XT and the newer AT running DOS 3.3.

TO: R V
FROM: R G
SUBJECT: Re: The Break key

Why not just turn break off at bootup.

TO: R G
FROM: B S
SUBJECT: Re: The Break key

The default (for DOS 3.2 anyway) is BREAK OFF at bootup!

TO: B S
FROM: R G
SUBJECT: Re: The Break key

I have a habit of ignoring defaults and re-initialising anything that I need to be correct. Thanks for the info though, as I had not come across it before.

++

The BoCoEx Index

Closing Prices on the Boston Computer Exchange for the week ending August 12, 1988

Machine	Closing Price		Recent High	Recent Low
IBM PC 076	$775	up 25	900	500
IBM XT 086	1200	–	1250	900
IBM XT 089	1250	down 50	1400	1050
IBM AT 099	2300	–	2350	1800
IBM AT 239	2600	–	2900	2300
IBM AT 339	3200	down 50	3650	2900
IMB PS/2 Model 30	1525	–	1700	1300
IBM PS/2 Model 50 20 Mb	2350	up 50	2500	1900
IBM PS/2 Model 80 40 Mb	4200	–	4300	4000
Compaq Portable I	825	–	950	700
Compaq Plus 20 Mb	1100	–	1100	900
Compaq Portable II 20 Mb	1850	–	2000	1650
Compaq Portable 286 20 Mb	2200	–	2350	1675
Compaq Portable III 40 Mb	3000	–	3200	2825
Compaq Deskpro 20 Mb	1200	–	1450	975
Compaq Deskpro 286 40 Mb	2500	–	2500	2000
Compaq Deskpro 386 60 Mb	5100	–	5100	4600
Macintosh 512	725	up 25	900	595
Macintosh 512e	800	–	925	650
Macintosh Plus	1050	–	1125	850
Macintosh Plus 20 Mb	1350	–	1450	1300
Macintosh SE	1950	–	2200	1700
Macintosh SE 20 Mb	2450	up 50	2525	2300
Macintosh II 80 Mb	4750	–	4750	4500
Apple IIgs 10 Mb	1400	–	1475	1175
Apple IIe	700	–	750	525
Apple IIc	575	up 75	750	400
Apple Laserwriter Plus	3100	–	3200	2700
Toshiba T3100/10	1750	–	1750	1550
Toshiba T5100	4100	–	4500	3600
NEC MultiSpeed EL	900	–	950	650
Zenith 181	1050	–	1075	1025

Index prices are based on configuration of standard systems with monochrome monitor and adaptor, but less the value of any software or other peripherals.

August Market Sizzles like the Sidewalks

It may be August and the sun baked buyers should be on vacation, but the market sizzled like the sidewalks and buyers overloaded the supply of most popular computers making a rising market.

The IBM traders were busy. The prices were relatively stable all week, despite minor drops in some models, but volume was strong and the market active. The AT 339 took a slight dive toward the end of the trading period, and fell $50 to $3200. What is remarkable is that this price has been so stable. The time may be drawing near for IBM to unleash their pile of trade ins and depress the market, but by mid August, there were no bears pushing down the prices. The IBM Model 089 closed down by $50 to $1250 and there were more signs that the 089 is still a suitable computer for the majority of computer users.

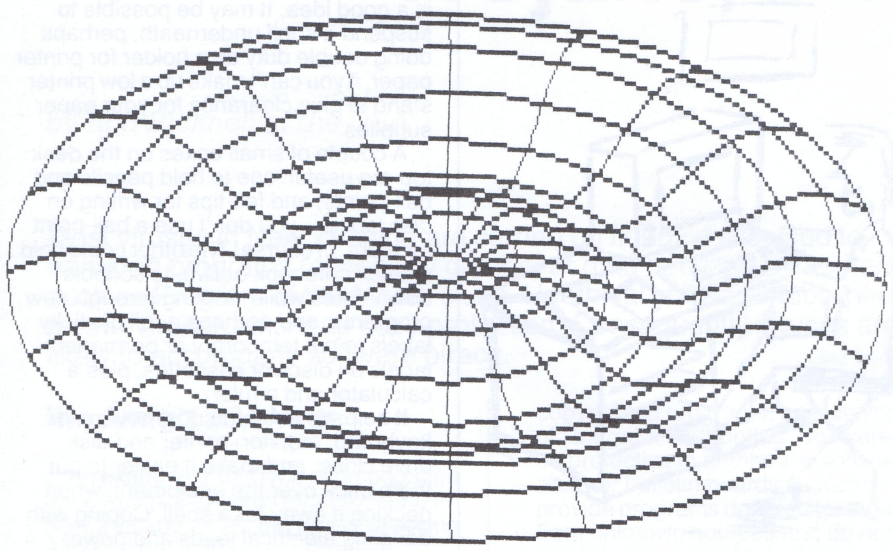
Brokers on the floor of the exchange were bombarded this week with buy orders for the Macintosh line. For the 512k Mac, heavy trading was the trend of the week. The Mac Plus and Mac SE with 20 megabyte hard drives were selling well with a $50 premium on the SE over last week's prices. Buyers were heard to say that they continue to find that the Plus is a "modal" machine, right in the middle of the Mac line and as a result, the machine of choice for developers. If you make it to operate on a Plus, the rest of the modern Mac's can use it... a modal machine. Orders were strong and many were sent away from the market without the machine of their choice. "If you can't get a Plus, then go for the 512," said one buyer, and this set the 512 up for another price hike to $US725, up $US25 from last week.

Calls from Macworld Expo rolled up, and brokers scrambled for equipment to meet the demand for the precious fruit. Demand for Macs make August one of the best times for owners to sell their older Macs. These favourable conditions for sellers of the Mac Plus are bound to end in the upcoming month os September. Students wanting to take advantage of University discounts, will be looking to upgrade from the Plus to the SE. These conditions promise to flood the market with older generation Macintosh equipoment causing prices on the secondary market to fall, and savvy sellers who speculate on this drop are getting good prices now.

The market even found it in its heart to push the old Apple IIc up $75 to $575 in an active market. There are times when the IIc slows to a trickle but of late there has been more interest in these systems. Many have been transacted with great collections of software and peripherals adding to their value.

A Concentric Plot

by Kurt Jacobs



*A radial sine wave with the general formula sin (((x^2+y^2)^0.5)*a)*b.*

"There's magic in the web of it." Shakespear.

In the February issue of Bits & Bytes, in his article on Atari Basic, James Palmer displayed a method of three dimensional graphing.

In this the projection onto the two dimensional screen was achieved by adding a component of the y coordinate to the x (slanting it), and by taking the z from the y (the z axis was vertical and extended above the other two). Using similar techniques, I would like to show another way of plotting the graph, as it gives a different visual effect (or basically for fun) and it lends itself to plotting spheres (or also basically for fun).

Instead of having the x and y values running in a nested loop, the idea is to choose them in concentric circles, and then link up these circles by their respectively chosen points.

To do this we use the trigonometric functions SIN and COS. An explanation follows, if you know something about trigonometry. If the hypotenuse is taken as the radius of the circle to be described, then the values of COS(theta) and SIN(theta), multiplied by the radius, are the x and y coordinates respectively. for every circle we bring theta through 360 degrees.

Listing 1 will display the "web" effect described above. As is, it has no hidden line removal. Changing the formula at line 60 will alter the graph.

Here are a few to try:
<1> F(AA,AB)=(X^2+Y^2)*.02 ; <2> F(AA,AB)=1/((1+X^2+Y^2)*.05); <3> F(AA,AB)=SIN(((X^2+Y^2)^.5)*.5)*.4; <4> F(AA,AB)=(20–(X^2+Y^2)^.5)*.2.

Lines 20 to 80 set up the coordinates in their respective arrays.

In general when projecting (lines 100 to 180 and 200 to 280) the multipliers are scaling factors and the additions and subtractions are positioning values.

Plotting more points gives greater accuracy (more flowing curves), but more lines tend to clutter up the graph. The solution to this problem is to work out more points but only to plot them on the lines we already have, and not to plot any more lines. Listing 2 shows the line numbers to be added or substituted into listing 1 to achieve this.

Now on to plotting a sphere. To plot a whole sphere we need to not only plot the positive numbers that are returned from the formula, but as square roots can be either positive or negative, the negation of these as well. Listing 3 shows the line numbers to be added or substituted into listing 1 to produce a sphere.

That, however, is not the only consideration involved with plotting a sphere. To achieve a nice, even curve, we do not want to choose the concentric circles at a fixed increase in radius, but at a fixed increase in angle around the curve of the sphere. The difference in lines 20, 35 and 80 shows this. The formula at line 35 being the one finding the radius of the circles.

Next month more spheres.

Listing 1:

```
5  SCREEN 2:CLS
10  DIM F(10,20),XA(10,20),YA(10,20)
15  SX=12:SY=3:SZ=12
20  FOR I=2 TO 20 STEP 2
30  FOR THETA=0 TO 360 STEP 18
35  AA=I/2:AB=THETA/18
40  X=COS(THETA*(1/57)*I
45  XA(AA,AB)=X
50  Y=SIN(THETA*(1/57)*I
55  YA(AA,AB)=Y
60  F(AA,AB)=20–(X^2+y^2)^.5)*.2
70  NEXT THETA
80  NEXT I
90  REM PRINT CIRCLES
100  FOR I=1 TO 10
110  FOR J=0 TO 19
120  X1=XA(I.J)*SX
130  X2=XA(I,J+1)*SX
140  Y1=150–(F(I,J)*SZ+YA(I,J)*SY)
150  Y2=150–(F(I,J+1)*SZ+YA(I,J+1)
   *SY)
160  LINE (X1+280,Y1–55)–(X2+280,
   Y2–55)
170  NEXT J
180  NEXT I
190  REM PRINT LINES
200  FOR J=1 to 20
210  FOR I=1 TO 9
220  X1=XA(I,J)*SX
230  X2=XA(I+1,J)*SX
240  Y1=150–(F(I,J)*SZ+YA(I,J)*SY)
250  Y2=150–(F+1,J)*SZ+YA(I+1,J)
   *SY)
260  LINE      (X1+280,Y1–55)      –
(X2+280,Y2–55)
270  NEXT I
280  NEXT J
```

Listing 2:

```
10  DIM F(20,40),XA(20,40),YA(20,40)
20  FOR I=2 TO 20
30  FOR THETA=0 TO 360 STEP 9
35  AA=I:AB=THETA/9
60  F(AA,AB)=SIN(((X^2+Y^2)^.5)*
   .5)*.4
100  FOR I=2 TO 20 STEP 2
110  FOR J=0 TO 39
200  FOR J=0 TO 38 STEP 2
210  FOR I=2 TO 19
```

Listing 3:

```
15  PI=3.14159:SX=7.2:SY=1.5;SZ=6
20  FOR N=0 TO 9
35  AA=10–N:AB=THETA/18:I=20
   COS((N*PI)/20)
```

University Affairs

The University of Waikato has announced an eight part initiative designed to foster closer relations between its new School of Computing and Mathematical Sciences, and the computer industry in New Zealand.

The application of information technology in New Zealand is an important economic sector, currently employing an estimated 25,000 professionals in this country. Recognising this importance, the University of Waikato has already launched a new four year BCMS (Bachelor of Computing and Mathematical Science) degree in 1988, with the intention of producing more technically qualified and focussed graduates for this important area.

To ensure that a close and on-going relationship can be established between the University and the computer industry, eight programmes of co-operation have now been introduced.

Senior Lecturer in Computer Science, Robert McQueen, has been responsible for the initiative, and is hopeful that the computer industry in New Zealand, especially the 200 largest employers of computer professional staff, will join in with enthusiasm.

McQueen thinks there will be particular interst in a Visiting Fellowship being established to encourage secondments of experience staff from the business community to the Department of Computer Science, for terms of three to six months, during which a mtually agreeable mix of teaching, research and publication will be undertaken.

Another programme likely to be popular is a new co-operative work experience internship course that has been introduced, where undergraduate students may receive a single course credit through a summer vacation placement at an approved industry site. The student would normally have comleted two years of study in Computer Science, and would be required to write a report on the experience.

Addition parts of the initiative include graduate recruitment assistance, a staff visitation programme, a liaison council, scholarships, sponsorship of research, and sponsored chairs.

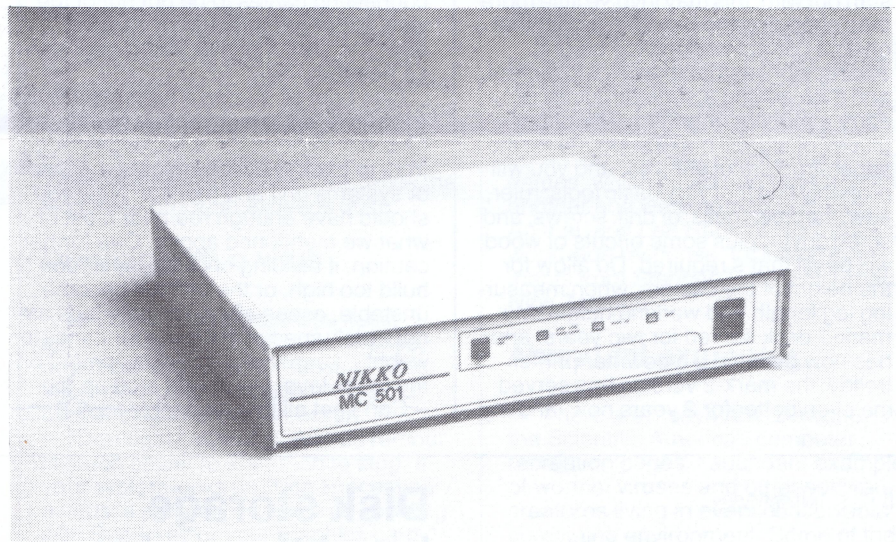
For further information contact:
Robert J. McQueen
Dept of Computer Science
University of Waikato
Private Bag, Hamilton
(071) 62889 ext 8184

Clean disk drives protect data

Computer malfunction, resulting in serious data loss or misreading, expensive downtime and servicing, can be caused by the smallest dust particles on the read/write heads of disk drives. Correct cleaning procedures are vital to help prevent this. Exceeding all international standards, new CleanDisk uses a unique system to ensure superior cleaning.

A pre-measured sachet of specially developed cleaning fluid is emptied into a slot on the CleanDisk. The slot ensures only partial moistening of the cleaning surface so when the CleanDisk rotates in the drive a continuous wet/dry cleaning of the head produces optimum results.

the CleanDisk is suitable for single or double-sided drives, and comes in a convenient storage box from computer stores.



Australian based Nikko Business Equipment Pty Ltd has released a compact standby uninterruptible power supply which it claims represents a breakthrough in size and price.

The MC 501 is rated 500 watts and can protect a PC and its peripherals against crashing for up to 25 minutes following a power failure.

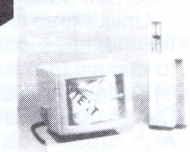
It features EMI/RFI filtering, spikes and under-voltage protection and electronic protection against short circuiting and overloading.

Weighing 13 kilograms the MC 501 contains sealed maintenance free batteries and measures 374mm x 411mm x 77mm high.

The unit is priced at $AUS999.00 and local distributors are being sought.

FREE

Bits & BYTES



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Assemble a Basic workstation

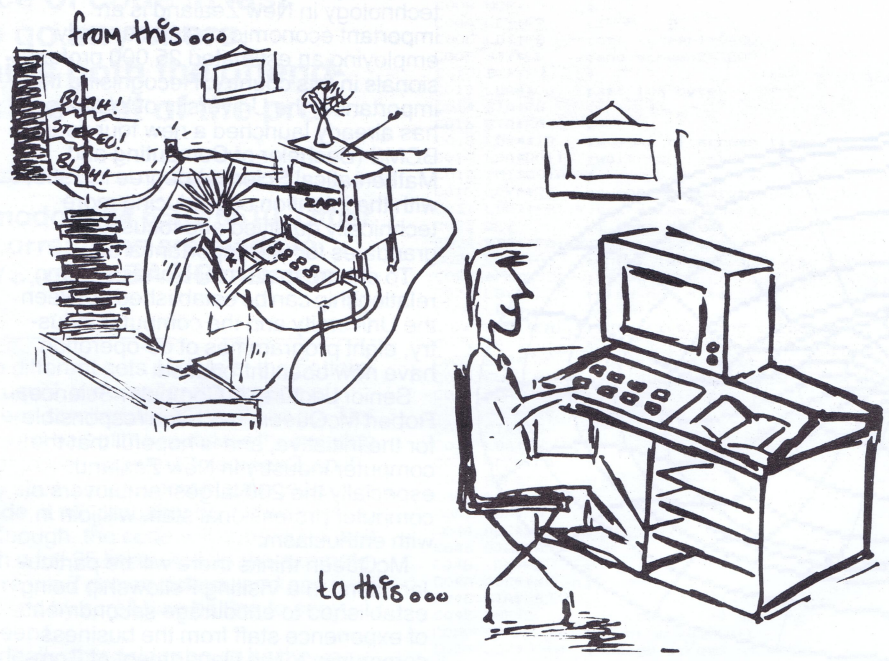
by David Cass

Two columns ago, we looked at the early stages of setting up a computer in the house, and how to make the best of an unsuitable environment. The next step beyond that is to set up a work station or controlled work environment.

This presupposes that it is possible to set aside a room, or part of a room, to use on a permanent basis for computing work. Not everybody is lucky enough to be able to do this, but a useful first step along the way is to build or buy a computer desk or trolley, on castors to allow movement as required. This way at least you can move a self-contained "computing unit" to a place in the house that is free from distraction or a corner out of the way, or even hook up quickly to the family TV.

I do say build or buy. For those of us on a tight budget, it is not difficult to make up your own computer desk, though you will almost certainly not end up with such a pleasant looking piece of furniture as if you bought a ready-made one new or secondhand. What you can produce, however, may be more functional for your particular purposes, as you can take note of your specific requirements, and design and build to them!

Bits and Bytes is not a carpentry journal, so I need not advise you on how to build a small table from scratch, and anyway there are dozens of books available from any library on this sort of topic. I think there is an easier alternative, and that is to start off with an old or unwanted small table of some sort, and amend it to suit. Depending on what you start out with, this may involve little more than chopping the legs to a length that gives a correct working top height, adding four castors to allow movement, and then adding a superstructure to carry a monitor or printer. The offcut pieces of leg will make supports for the superstructure of shelves, and you will probably find that very basic tools; ruler, saw, hammer, nails, or drill, screws, and screwdriver, plus some offcuts of wood, will be all that's required. Do allow for the height of the castors, when measuring leg length and working height! My mark-1 desk served for two years, and has now become a typewriter/printer trolley: the mark-2 version has served me even better for 2 years now, and my wife barely noticed the disappearance of her old sewing table!



What sort of facilities does a desk or workstation need? First and foremost, a reasonable width and depth of work area, at the right height. You need room for a keyboard, perhaps a separate systems unit or monitor, books or magazines space, room for a disc drive or cassette unit, a strong joystick-waggling plastform or area, and room for connecting cables to be put out of the way, either gathered up or dangled down behind! A printer stand may also be needed.

Can't get all that on a table top? Build a top level, six to eight inches higher, set back a little perhaps, and deep enough front to back to accommodate a printer or systems unit and monitor. Now you should have enough room for most of what we mentioned above. One further caution: if building on a top layer, don't build too high, or the unit will become unstable, especially if the table legs are not widely spaced. If it has a tendency to wobble, keep the heavier equipment on the lower levels, and light stuff up top.

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Storage for disks or cassettes can be a problem, but once again, you need not pay the earth for a solution. Purpose-designed units do a great job, but an adapted household item can do an adequate job for almost nothing! You don't have to look too hard to find plastic household storage items or discarded packaging, preferably plastic, but sturdy card will do, if sizes to fit cassettes or discs of the 5.25, 3.5 or 3 inch persuasions. Cards can be cut to shape for dividers, and very soon that unruly collection of tapes or discs can be hit into shape. For my 3" disc collection, I've used a plastic cupboard tidy, which slots neatly into place on three screws on the end plate of my desk, conveniently to hand.

Manuals, reference books and magazines can fit into drawers, if the desk or table that you're modifying has them, otherwise a box to organise them is a good idea. It may be possible to suspend a shelf underneath, perhaps doing double duty as a holder for printer paper, if you can't make up a low printer stand to give clearance for your paper supplies.

A couple of small boxes on the desk top are useful; one to hold pencils and ball-points, and felt-tips for writing on disc labels – you don't use a ball-point for them, of course! The other could hold a small notebook or two, to scribble down notes while working through new programs, and perhaps a roll of sticky labels to put temporary or permanent labels on discs or cassettes, plus a calculator and a ruler.

It helps to keep the dust covers for keyboard, monitor, printer and disk drive close, and make it easier to put them back over the equipment, when packing it away for a spell. Coping with dangling electrical leads and power cords can be a bit tedious. A 4-socket power board (switched or unswitched) on one end plate of the desk, with the individual plugs for printer, monitor and systems unit, and disc drive plugged into it, will help. Route the power leads along the back or front undersides of the desk, on hooks to keep them out of the way, and with wire-ties to shorten loops. The connecting leads between system unit and monitor, disc drive and systems unit, and printer and systems unit, are treated similarly, kept away from each other, and power leads in particular, to minimise interference problems which seemed otherwise very noticeable on my old Spectrum in particular.

Well, that seems more than enough on getting prepared for serious or fun computing! Comfortable and/or organised, primed with advice, now's your chance to start really moving with that computer! Next time perhaps, some thoughts on starting on programming: how to start, best ways to learn by yourself, and where to go for tuition. In the meantime, enjoy yourself, experiment, but do get that hands-on time!

US News

75% of computers flunk FCC emission tests

The Federal Communication Commission has told the San Francisco Chronical that 75% of the PCs it's recently tested failed radio interference standards. The report says clones from Asia are the most flagrant violators.

The FCC official quoted say companies are submitting "laboratory queens" or prototype machines to the FCC for approval, then failing to manufacture the systems that have passed emission standards. One testing house says some 150 off-the-shelf computers were recently examined before one was found to be in compliance. Such big name companies as Hewlett Packard, IBM, and MItsubishi were found among the violators, Merle Coe, president of HAAR Industries, told the newspaper.

The violators get fines of $2,000 but often continue to flaunt the law, says the report. That's because the FCC approval process is lengthy and the competition in the computer marketplace is fierce. "The problem is the off-shore guys," reported one testing official.

Disk storage breakthrough

Imagine one 3½" diskette holding the equivalent of a 20 megabyte hard disk drive. It's not the stuff of fantasy, but of reality, as Insite Peripherals has created a drive that can store that much data on the small-sized floppy. Such a high-capacity floppy could make data back-up, now a lengthy process involving many diskettes, a simpler process. The technology involves modification of the diskette to accommodate a special stripe of optically and magnetically recorded data.

Unlike many new disk drive technologies, this one seems destined to make it to dealer shelves. The teams of Kodak and Verbatim, and Xidex and Dysan, have licensed to produce the high capacity diskettes. Insite expects the first disks should be available by the first quarter of next year.

UK News

In the UK the Data Protection Registrar is sharpening his pencil. Sources suggest the Registrar's office is about to dramatically increase the number of prosecutions for non-registration of personal data by companies and individuals. To date, the Registrar has taken two firms to court – and won...

ATARI is said to be developing a hand-held PC, according to Microscope, a UK computer trade weekly. Details of the machine are scarce, but it expected to be similar to the Psion Organiser II, and be MS-DOS compatible...

IBM and Computerland secure ITV olympic contract

IBM and Computerland, one of Big Blue's largest dealerships, have landed a prestigious contract to kit out ITV Sport's television studios for the Seoul Olympics.

The TV company's Olympic coverage, which lasts from 16 September through to 2 October, will be assisted by several IBM PS/2 Model 50Z and 70 machines. The PS/2 machines will be used by TV studio staff to compile and support a database on all the competitors and results from every event of the 26 Olympic sports taking place in Seoul.

With over 15 hours of scheduled programming coming out of ITV Sport's London studios, the Olympics should be a good test of how the PS/2's stand up to almost constant use. Let's hope they're using branded diskettes...

Japan News

Toshiba's real-time telephone translation of English/Japanese

Toshiba has developed the world's first Japanese-English automatic character translation phone, taking advantage of AI and satellite communications technology. The phone translates conversations from Japanese to English and vice versa when the chats originate via keyboard.

For instance, Japanese sentences written in Tokyo are translated in real-time into English by an engineering workstation, and the translated sentences are displayed on the screen in Auckland through satellite communications. In the same way, the process goes from Auckland to Tokyo. Japanese sentences appear on the upper part of the screen and Japanese-translated replies appear on the lower part, so you can make a conversation by comparing the sentences. Toshiba calls it, "Global-scale simultaneous interpretation."

The translating procedure is being hailed as speedy and precise, able to grasp even vague meaning.